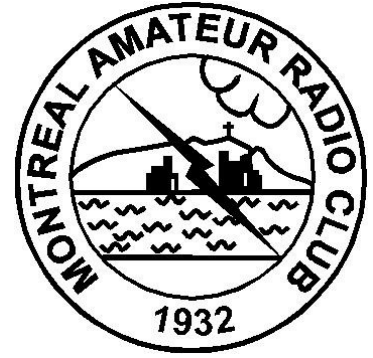


marcOgram

Official Publication of The Montreal Amateur Radio Club Inc.
Box 53047 - RPO Dorval, Dorval Quebec H9S 5W4



Volume 67, Number 9

Summer 2021

NEXT MEETING

Tuesday 28 September 2021 at 20:00 via ZOOM.

NEXT MONTH: To Be Announced

General meetings are being held via the Zoom platform. Below are the details you need to join the meeting. A rag-chew session starts at 19:30 with the formal meeting starting at 20:00.

Join Zoom Meeting: <https://zoom.us/j/99313399988?pwd=YXcwMGJQdStkYVBwa3Fkc2hxa21oZz09>

Meeting ID: 993 1339 9988 Passcode: 898003 Or by phone 438-809-7799 using the above meeting ID and passcode.
Important: Please use a headset or headphones and make sure to test your mic/camera ahead of the meeting.

We hope to see you there.

FROM THE EDITOR'S DESK

CONGRATULATIONS!

**To our second batch of
newly graduated
amateur radio operators!**

Our volunteer accredited examiner Eamon, VE2EGN, reports that the marks ranged from 86 to 93 (all with honours), and that a few mentioned how much they enjoyed the MARC course.

The group already have their callsigns: Pragyana Hazarika, VA2HAZ, the first three letters of his last name, Joe Arcuri, VE2EZX, who may have chosen letters standing for "easy exam", Charles Charrier-Tremblay, VE2GFC, and Philippe Jaleev, VA2KWT. Philippe has already exercised his privileges by joining the VE2RED Wednesday net. So look forward to contacting them as they start off their exploration of amateur radio possibilities. Some might go into the field of moonbounce, and erect a gigantic array of various types of antennae for that purpose.

73 de Nora, VA2NH

- . . . -

ARTT TECK TALKS

Sharing ham radio tech talks with the amateur radio community!

We are a group of amateur radio enthusiasts who desire to share ideas and information with others in the Amateur Radio service using Tech Talks shared on ZOOM. They are archived on our web site ARTT.ca. This group will be used to notify people about upcoming Tech Talks and to encourage discussion of the topics that have been covered. If you would like to contribute a Tech Talk on any amateur radio topic, please send an email to contact@artt.ca. The more people that can contribute, the better the information will be. This is an open ham radio community!

Group Information - <https://artt.ca/>

89 members, 18 topics, last post: Apr 12, started on Dec/26/20

Group Email Addresses

Post: ARTT@groups.io

Subscribe: ARTT+subscribe@groups.io

Unsubscribe: ARTT+unsubscribe@groups.io

Group Owner: ARTT+owner@groups.io

Help: ARTT+help@groups.io

The MARCogram is published nine times per year on the second to last Wednesday of September through June, excepting December by the Montreal Amateur Radio Club. Advertising and copy deadline is one week prior to publication.

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General Members ... \$30.00
Family Members (per family) ... \$35.00
Postal delivery of MARCogram ... \$ 5.00

The membership year runs from September 1 to August 31. Memberships received on or after June 1 commence immediately and extend through the subsequent membership year - covering a period of up to fifteen months.

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Eamon Egan, VE2EGN ve2egn@marc.ca

Club Call Sign: VE2ARC

Club Website: <http://www.marc.ca>

Repeaters

VE2BG 147.06 MHz (+) 103.5

Owned and operated by the Montreal Amateur Radio Club. Back on the air but still looking for a new location..

VE2RED 147.27 MHz (+) 103.5

On the air from Ridgewood Ave. in Montreal; CTCSS tone of 103.5 Hz for access. Thanks to Claude Everton, the VE2RMP group and Metrocom for making this possible.

The repeaters are open to all amateurs.

Meetings of the Board of Directors

Meetings of the Board of Directors are held on the first Tuesday of the month (Aug to June) at 19:30 on-line using the Zoom platform. The club no longer holds in-person board meetings. If you have questions, concerns or suggestions for the Board to discuss, please send an email to ve2arc@marc.ca for inclusion in the meeting agenda.

Club Activities

Monthly Meetings are by ZOOM

(last Tuesday of the month)

September 28 - TBA

October 26 - ANNUAL GENERAL MEETING

Every Wednesday, @ 20:00 (00:00Z), go to the net on VE2RED.
See page 3.

Radio Classes

A second class of our Basic level Course that started May 1st 2021, held via Zoom, has ended. If you know of anyone interested in taking the course, please direct them to <https://marc.ca/course/> for more information. Online registration is now closed until the next session.

MARC Hamfest

The 2021 MARC flea market was cancelled.

It will be back but we still need a good location. Any ideas?
Please contact any of the board members.

Ideas are welcome!

Go to <http://marc.ca/fest/> for more information as it happens.

Incoming QSL card service

As has been mentioned in previous MARCograms, we are resuming the club's service of having incoming QSL cards sent to the club for members to pick up at meetings. This is a service which we are offering to our members which both saves the individual members money as well as makes more efficient use of our collective resources.

If you would like to avail yourself of this service please send an e-mail to qsl@marc.ca and we will add you to the list of cards that the incoming bureau sends to the club and bring them to the monthly meetings.

SolderSpot

Group build Power Supply Project - By Leo VE2SI

If you're interested and even if you've spoken with me before, please send an email to VE2ARC@marc.ca and indicate your level of interest.

Participation is open to everyone and MARC membership is not a requirement. Due to COVID-19, SolderSpot is temporarily on hold. Other options are being considered.



UPCOMING FLEAS/EVENTS

2021

What: NEAR-Fest XXX
Who: New England Amateur Festival, Inc.
When: Fri & Sat, 15 & 16 Oct, 2021
Where: Deerfield Fairgrounds
 Deerfield, NH

2022

What: Iroquois ARC Fleamarket
Who: Iroquois Amateur Radio Club
When: Saturday, 2 Apr 2022
Where: Iroquois ON

What: London Vintage Radio Club Flea Market
Who: London Vintage Radio Club
When: Saturday, 11 Jun, 2022
Where: Guelph, ON

What: Carp 24th Annual Hamfest
Who: Ottawa Amateur Radio Club, Inc.
When: Saturday, 10 Sep, 2022
Where: Carp Agricultural Fair Grounds, Carp, ON

Note from the editor.
 Due to COVID -19, the list of hamfests and events is severely limited. Please check with the organizing authority before planning to attend as some may be cancelled.

VE2RED TUESDAY NET REPORT

Any discrepancies, please inform Leo, VE2SI

Please join us every **Wednesday** evening at 20:00 local on VE2RED on 2m output frequency of 147.270 MHz (+600 kHz input offset) CTCSS tone of 103.5 Hz. Everyone is welcome.

We have a few Net operators hosting it, but we're always interested in adding to this team if you're interested. Send me an email if you would like to try out Net Operations for an evening.

Leo, VE2SI
leo49@videotron.ca

2021-05-26 Net commenced 20:00 local, 00:00Z

Net control Leo, VE2ARC (VE2SI)
 VE2NGH, George, St. Laurent
 VA2ONE, Andrew, St. Basil le Grand
 VA2LEQ, Lee, Laval
 VA2CNE, Cedric, Dorval
 VE2MRN, Marco, Lachine
 VE2MPD, Dave, Verdun
 VE2GFY, Bob, Chateaugay
 VA2NH, Nora, St. Lazare
 VE2LRZ, Erick, Cote St. Luc
 VE2RI, René, Roxboro
 VE2HKG, Henry
 VA2XS, Mike, St. Laurent
 21:19 Net closed.
 13 check-ins.
 Discussion: Not recorded.

2021-06-02 Net commenced 20:00 local, 00:01Z

Net control Leo, VE2ARC (VE2SI)
 VE2NGH, George, St. Laurent
 VA2LEQ, Lee, Laval
 VA2NH, Nora, St. Lazare
 VA2CNE, Cedric, Dorval
 VE2MPD, Dave, Verdun
 VA2QED, Jixin
 VE2HKG, Henry
 VE2FSE, Frank
 VE2IPI, Sadi
 21:40 Net closed.
 10 check-ins.
 Discussion: Is the understanding of RF increasing or decreasing in the public eye?

2021-06-09 Net commenced ~20:00 local, ~00:00Z

Net control Leo VE2ARC (VE2SI)
 VE2NGH, George, St. Laurent
 VE2MPD, Dave, Verdun
 VA2NH, Nora, St. Lazare
 VA2CNE, Cedric, Dorval
 VE2HKG, Henry

(Continued on page 4)

(Continued from page 3)

VE2XHL, Jong, St. Leonard
VA2ONE, Andrew, St. Basil le Grand
VE2LRZ, Erick, Cote St. Luc
21:14 Net closed.
9 check-ins.

Discussion: Are you equipped for portable operation, Field Day?

2021-06-16 Net commenced 20:00 local, 00:00Z

Net control Leo VE2ARC (VE2SI)
VE2NGH, George, St. Laurent
VE2MPD, Dave, Verdun
VA2LEQ, Lee, Laval
VE2SZU, Ariel
VE2HKG, Henry
VA2NH, Nora, St. Lazare
VE2IPI, Sadi
VE2HS, Pierre
VA2CNE, Cedric, Dorval
VE2BAB, Mitch, Cote St. Luc
21:00 Net closed.
11 check-ins.

Discussion: Has your knowledge of amateur radio helped you in your career or job?

2021-06-23 Net commenced 20:00 local, 00:00Z

Net control Leo VE2ARC (VE2SI)
VE2NGH, George, St. Laurent
VE2MPD, Dave, Verdun
AC2CZ/VE2, Chris, St. Lambert
VE2LRZ, Erick, Cote St. Luc
VA2CNE, Cedric, Dorval
VE2SZU, Ariel
VE2MRN, Marco, Lachine
VE2WRH, Wayne, Cote St. Luc
VE2HXX, Henry
VE2XHL, Jong, St. Leonard
VA2NH, Nora, St. Lazare
VA2MKX, Mohammed
VE2FXO, Charles, Ville Emard
VE2HS, Pierre
VA2QED, Jixin
~21:42 Net closed.
16 check-ins.

Discussion: Operations on the lower bands, 135kHz, 472kHz?

2021-06-30 Net commenced 20:00 local, 00:00Z

Records not available.

2021-07-07 Net commenced 20:00 local, 00:00Z

Records not available.

2021-07-14 Net commenced 20:00 local, 00:00Z

Net control Leo VE2ARC (VE2SI)
VE2YI, Claude, Laval
VE2NGH, George, St. Laurent
VA2NH, Nora, St. Lazare
AC2CZ/VE2, Chris, St. Lambert
VE2DQO, Mike, Pointe Claire
VE2FSC, Frank

21:02 Net closed.

7 check-ins.

Discussion: Where do you buy/obtain your RF parts?

2021-07-21 Net commenced 20:00 local, 00:00Z

Net control Leo VE2ARC (VE2SI)
VE2NGH, George, St. Laurent
VA2CNE, Cedric, Dorval
VA2LEQ, Lee
VA2NH, Nora, St. Lazare
VE2FSC, Frank
20:52 Net closed.
6 check-ins.

Discussion: What books on amateur radio do you have, or that you have found to be helpful?

2021-07-28 Net commenced 20:00 local, 00:00Z

Net control Leo VE2ARC (VE2SI)
VA2LEQ, Lee, Laval
VA2CNE, Cedric, Dorval
VE2EGN, Eamon, NDG
VE2SZU, Ariel
VE2MPD, Dave, Verdun
VE2DNN, Andrew, Pierrefonds
VA2NH, Nora, St. Lazare
VE2TSM, Mario, Rawdon
VE2WES, Sylvain, St. Gabriel de Brandon
VE2HXB, Mark
VA2LY/mobile, Lyubo
21:21 Net closed.
12 check-ins.

Discussion: How accurate are SWR meters?

2021-08-04 Net commenced 20:00 local, 00:00Z

Records not available.

2021-08-11 Net commenced 20:00 local, 00:00Z

Net control George VE2ARC (VE2NGH)
VE2LRZ, Erick, Cote St. Luc
VA2CNE, Cedric, Dorval
VA2KWT, Philip, Verdun
VE2EGN, Eamon, NDG
VA2ONE, Andrew, St. Basil le Grand
VA2HMD, David, St. Jean sur Richelieu
VE2FSE, Frank, Pointe Claire
21:20 Net closed.

8 check-ins.

Discussion: Operating, favourite bands, modes etc?

2021-08-18 Net commenced 20:00 local, 00:00Z

Net control George VE2ARC (VE2NGH)
VE2SI/mobile, Leo, St. Lazare
VA2NH/mobile, Nora, St. Lazare
VE2SZU, Ariel
VA2LEQ, Lee, Laval
VE2LRZ, Erick, Cote St. Luc
VA2CNE, Cedric, Dorval
VA2KWT, Philip, Verdun

(Continued on page 8)

HARDROCK-50 LINEAR AMPLIFIER KIT

A REVIEW

By Kevin, VE7ZD / K7MCQ, courtesy of The Communicator Blogspot,
Surrey Amateur Radio Communications.

Synopsis.

The Hardrock-50 (see Figure 1) is a US-designed, 5W-in to 50W-out HF amplifier that operates on the 160 through 6m amateur bands. It includes automatic band switching, does not require tuning, and integrates seamlessly with popular rigs such as the Elecraft KX3 or Yaesu FT-817 series. An optional QSK board and automatic antenna tuner are available. The amplifier runs on 13.8 VDC and draws under 10 amps at full output.

The HR-50 is provided as a well-documented kit and can be assembled in about ten hours. It aligns easily using common test equipment and performs well. My own kit easily outperformed the amplifier's design specs. Price is US\$299 from Hobby PCB in Florida at <https://hobbypcb.com>.

Background

Having recently returned to amateur radio, I was interested in the new digital modes, and especially the new digital HF mode FT8. My new Elecraft KX3 performed very well on the mode, and I was able to achieve WAS (Worked All States) in about three weeks using the radio's maximum recommended digital output of 5 watts into my 23-metre long-wire antenna.

That said, working DX using FT8 while QRP was quite difficult, and although I worked a small number of foreign stations, I found that it took quite a bit of effort to be heard among the other stations who were using higher power and better antennas than I have. I had no problem hearing considerable DX; the problem was that they usually did not hear me. Something had to be done!

I started researching linear amplifiers with an output of 50 to 100 watts, thinking that being able to boost my signal at the antenna would likely make me more competitive and allow me to work much of the interesting DX that I had been hearing.

I learned that 100-watt class amplifiers were either low quality and affordable, or of high quality, but more expensive than my limited budget would allow. Reviews of some of

the cheap amplifiers showed them to generate high amounts of distortion and even spurious illegal emissions. Not something that I would allow in my station!

Additionally, I doubted the necessity of running 100 watts on FT8 (my main communication interest) as the mode performs so well on very weak signals that more than 10-30 watts is hardly ever required to work global DX. 50 watts would give me enough "edge" to work a lot of DX.

My extensive research led me to a US-designed amplifier kit called the "Hardrock-50", from a small firm called "Hobby PCB" (Fig. 1) in the eastern US. The amplifier covers 160 through 10 metres with an output of approximately 50 watts for 5 watts input, and about 40 watts output on 6 metres.

The prototype for the Hardrock-50 was a winner in a design contest sponsored by the ARRL in 2010. The much-evolved production version, now called the HR-50, is FCC "type accepted" and meets all legal requirements for amateur band operation.



Fig. 1 Hardrock-50 HF Power Amplifier

Reviews of the HR-50 were excellent, and the documentation on the Hobby PCB website showed that the assembly and operation manuals were complete and well-designed,

(Continued on page 6)

(Continued from page 5)

and reminiscent of the classic “Heathkit” manuals of the 1950s-1990s. It looked like a good solution to my needs.

Purchase

At US\$299, the price for the kit met my budget, so in late January I “took the plunge” and ordered the amplifier kit. I ordered the optional full break-in (QSK) board as a US\$30 option, but decided against the internal automatic antenna tuner (a US\$179 option) as I already own a nice external auto-tuner from LDG. I planned to use that with the new amplifier.

The kit arrived in a few days. The parts were all of good quality, and the kit was organized into sub-packs of parts for each main component of the assembly process (front panel; back panel; main PCB, et cetera).

Assembly

I downloaded the HR-50 assembly manual to my iPad and followed it step-by-step. The manual is well-written and clear. There are three PCBs provided: for the front panel, the back panel, and the larger main PCB. My kit contained a fourth PCB for the optional QSK board. All the PCBs come pre-populated with the key surface mount components such as the microprocessors which control the amplifier. The PCBs are manufactured off-shore but quality is good. No SMD soldering is required.

Assembly starts with the front panel and works through the back panel, the main PCB, and lastly, the QSK board for those customers who have purchased this option. Assembly consists of inserting and soldering through-hole devices such as the four MOSFET power transistors, band switching relays, connectors, and headers and short jumper cables which link the amplifier’s boards together.

The optional QSK board is installed above the main PCB through provided headers and nylon spacers. Hardware is of excellent quality (stainless steel) and everything fit together perfectly.

Assembly was straightforward and I encountered only a few issues with the assembly steps. For example, in one step in assembly of the main PCB, I failed to read the step to the very end, and unfortunately installed two 2-pin terminal blocks which were NOT required if one is installing the QSK board. I had to de-solder the two terminal blocks as they would mechanically interfere with the QSK board to be installed above. A minor inconvenience, and technically my error, as I should have read the step to the very end!

An amplifier is an analog device, so the main PCB contains

about 15 toroidal inductors which are part of the different ham band filters. The ~1.5 cm cores and a generous supply of enameled wire are provided. Alternatively, a full set of pre-wound toroids is available as a kit option for US\$30.

I chose to wind my own toroids for the experience, as I had never wound smaller toroids such as these. The directions in the manual were clear and photographs of what the finished toroids should look like are included in the assembly manual, so I decided to do the winding myself. I thought that it would be a great opportunity to learn a new skill. See Figure 2 below.

Amplifier filter “Q” (and consequently, amplifier performance) is improved by taking care to wind quality toroids, so it is worth the time to complete these assembly steps properly. The turns need to be tightly wound and spaced evenly. Critical is proper counting of the turns through each core. The toroid winding steps took me about two hours.

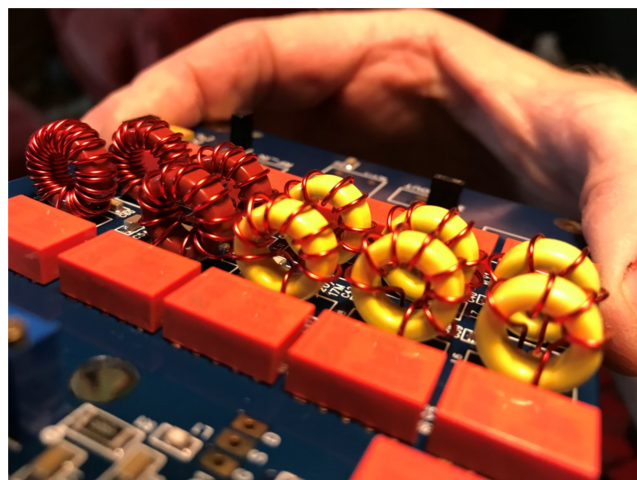


Fig. 2. Toroids

The hardest part of winding the toroids is removal of the insulation from the wire ends. This can be accomplished either by scraping (X-Acto knife or Dremel tool) or via application of heat from a soldering iron. I used a combination of the soldering iron method and scraping with an X-Acto knife. This took a couple of hours, but I got it done. After building the kit, I discovered a great tool for stripping enameled wire. It’s designed for this purpose and works really well. I ordered one for US\$14 on Amazon and would definitely recommend using one, as it makes stripping the enameled wire quick and easy!

Three small transformers must also be wound using supplied wire, but these were straightforward once I had completed the big toroid winding job.

The kit includes a large extruded aluminum heatsink to dissi-

(Continued on page 7)

(Continued from page 6)

pate heat from the four power MOSFETs. This serves also as the chassis for the entire amplifier. The main PCB is secured to the heatsink, and the front and back panels are bolted to the ends of the heatsink. The four MOSFETs and a helpful temperature sensor are also mechanically attached to the heatsink. The provided aluminum cover then integrates everything into a nice-looking device, as can be seen in the attached photos of my amplifier.

After about ten hours of (fun) work over three days, my amplifier was complete and ready for alignment and testing. See Figure 3 below.

Alignment

Alignment of the HR-50 requires a 13.8 VDC power supply capable of about 10 amps, a small screwdriver and an ammeter such as available on common DMMs. The process consists of setting zero-drive bias current on the four MOSFETs.

This was a straightforward process and my new amplifier tuned up easily and quickly.

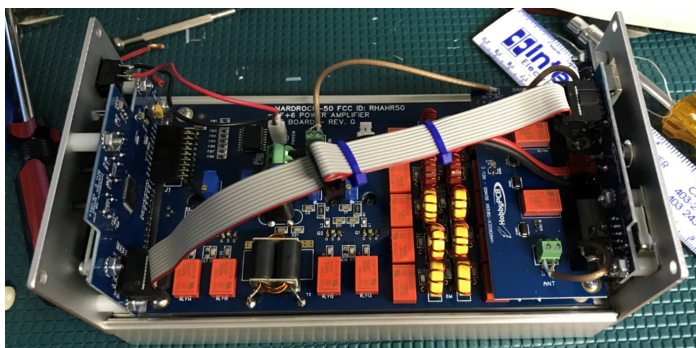


Fig. 3 Hardrock-50 HF Power Amplifier

Testing

Next came the moment of truth! I connected the amplifier RF input to my KX3, and the amplifier output to a good quality dummy load. For the automatic control signals, I connected my KX3's control output signals and serial port to the amplifier through a small KX3 interface board that I bought from Hobby PCB as a US\$30 option.

I could have made my own (simple) control cable but chose the easy route in this case! Cable pinouts are provided in the assembly manual for those who want to “roll their own” interface cable.

Three settings on the KX3 had to be changed to set the inter-device baud rate and route PTT to the HR-50. Similarly,

three settings had to be set on the HR-50's control menus. Then, I was ready to go!

“First Light”

First, I wanted to confirm that the HR-50 was receiving band change information from my KX3. I reduced my KX3's output power to 0 watts and cycled up and down through the amateur bands on my KX3. The HR-50 received the band change data and nicely tracked band changes.

Next came a test of amplifier performance. I keyed the transmitter (still into the dummy load) and increased power to 0.5 watts. The HR-50 was working! I cycled through the bands and noted that power output was working well. On some bands, for example, I could easily exceed 50 watts output with only 2 to 3 watts of drive. I was suitably impressed!

On other bands, notably 20 and 80 metres, however, I noted that the HR-50's output was strangely low. What could be the cause?

Human Error

I'm as human as the next guy, and this section describes how I resolved this odd “low power on some bands” anomaly.

I investigated the low power situation, particularly on 20 metres, for a few days without resolution. I suspected that perhaps I had made an error in winding one of the toroids. I emailed Hobby PCB with a few questions and was honestly surprised when I got an email back from the amplifier's inventor, Jim Veatch (WA2EIJ) within an hour.

Jim was very supportive and gave me some suggestions for testing. He reminded me early that “Hobby PCB guarantees a working amplifier for every customer”, and that if we could not resolve the problem, that I could simply ship my HR-50 to him and that he would personally find the problem and fix it himself. Impressive customer service!

I did some troubleshooting using Jim's suggestions, and the HR-50 seemed to be “normal” in all respects. Very odd; I pondered this overnight.

The next morning, I decided to go “back to basics” and troubleshoot from the KX3 outward. I put a wattmeter on the KX3's output – something that I had not done before as I was relying on the rig's internal (more accurate) digital wattmeter.

I noted that on 20 and 80 metres (the bands with the lowest HR-50 output) that, even if I set my KX3 to read 5 watts on

(Continued on page 8)

(Continued from page 7)

its internal wattmeter, my external meter only read about 1 watt output. How could this be? The rig was almost new. Had I “blown the finals”, as we used to say in the old tube-based rig days?

Then, a glance at the KX3’s display caused something to “twig”: the KX3’s internal ATU was still on! The KX3 had previously been used with my non-resonant-on-20-and-80 longwire antenna and still assumed that it was feeding that antenna, not the amplifier. The rig was now connected to the (resonant) HR-50. Eureka!

I disabled the KX3’s ATU, and the external wattmeter now showed 5 watts output on each band. The HR-50’s output into the dummy load jumped to what it should be, 50 watts+ on 160 through 10, and 40 – 50 watts on 6 metres. I was in business! See Figure 4 below.



Fig. 4 Hardrock-50 HF Power Amplifier, in action.

Performance

I hit the bands with my longwire and noted vastly improved reception of my signal by both NA and DX stations. The option to run up to 50 watts is great and has allowed me to make many more contacts that I could with 3 (maximum 5) watts digital on my “barefoot” KX3.

Now, about three weeks in, the HR-50 continues to perform perfectly. The front panel user interface is easy to use, and the amplifier tracks band changes automatically.

Also appreciated is the fact that the amplifier is unaffected by high SWR at the antenna connector. An open circuit, or even a dead short at the antenna terminal will not damage the MOSFETs. Of course, I have not made either of these errors, but it is nice to know that the finals cannot be “blown”, like in the “olden days”!

The heatsink gets quite hot using digital modes like FT8 with its 50-percent duty cycle, and heatsink temperature can reach 50 to 60 degrees Celsius. However, these heatsink temperatures are within the amplifier’s “normal” range, and the HR-50 operating manual says that external cooling should only

be considered if the heatsink temperature goes above 90 degrees C. This is unlikely, in my experience.

The QSK board in the amplifier also works well and provides silent and extremely fast T/R switching, including “inter-dit” reception when using CW.

Conclusion

For my station and operating profile, the Hardrock-50 was a great investment. The kit is professionally designed and well documented, the amplifier works as specified, and it is backed by excellent support. Assembly was straightforward and fun, and I learned something about winding toroids. I will also not forget to turn off my KX3’s ATU when I return from portable to base operation!

I am extremely happy with the HR-50 kit and would highly recommend it to anyone running QRP and looking for a moderate boost in output power.

That’s it for this review. Please feel free to send comments and questions to me at mcquiggi@sfu.ca.

Kevin VE7ZD / K7MCQ



(Continued from page 4)

VA2KWT, Philip, Verdun
VE2HS, Pierre, Dorval
VA2XS, Mike, St. Laurent
21:20 Net closed.
8 check-ins.

Discussion: Test equipment. What do consider to be absolutely essential test equipment?

